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WATER POLLUTION PROBLEMS OF THE GREAT LAKES AREA

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
CHICAGO, ILLINOIS

OCTOBER 1967

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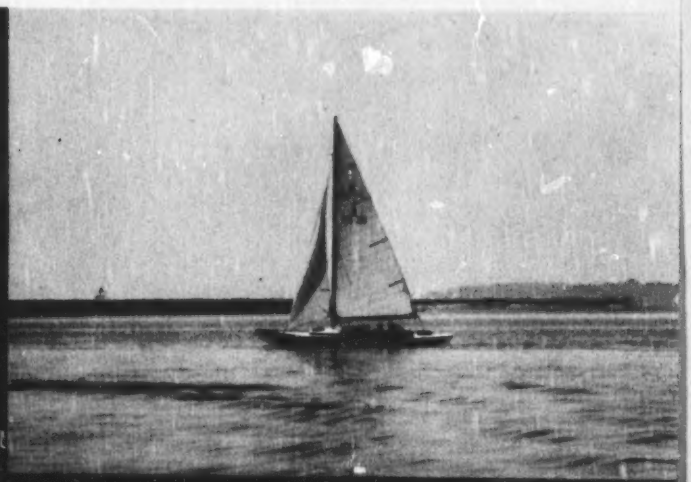
WATER POLLUTION PROBLEMS



OF THE GREAT LAKES AREA

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This revised edition of the water pollution study of the Great Lakes area identifies various physical problems: biological imbalance; buildup of dissolved solids; bacterial contamination; chemical contamination; and oxygen depletion. Management problems are mentioned. Various federal activities for pollution control are reviewed along with state, regional, local, industrial, interstate, and international activities. Recommendations are made for specific action.

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WATER POLLUTION PROBLEMS OF THE GREAT LAKES AREA

September 1966

(Revised October 1967)

UNITED STATES DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
Great Lakes Region Chicago, Illinois

- FOREWORD
- IMPORTANCE OF THE GREAT LAKES
- WATER POLLUTION PROBLEMS
- WHAT IS BEING DONE
- ACTION NEEDED

FOREWORD

The first edition of this information pamphlet was published in September 1966. The water pollution problems identified in that edition have not materially changed in significance or gravity. However, such is the pace of evolution in water pollution control today that a need was felt for revision to incorporate some of the recent developments on the legislative and organizational front. This revision was prepared to fill that need.

The fight for clean waters is being pressed today as never before. At the signing of the Water Quality Act of 1965 on October 2, 1965, President Johnson said, in part:

> "...This moment marks a very proud beginning for the United States of America. Today, we proclaim our refusal to be strangled by the wastes of civilization. Today, we begin to be masters of our environment.
>
> "But we must act, and act swiftly. The hour is late, the damage is large...
>
> "No one has a right to use America's rivers and America's waterways that belong to all the people as a sewer...
>
> "...This bill that you have passed, that will become law as a result of a responsive Congress, will not completely assure us of absolute success. Additional bolder legislation will be needed in the years ahead. But we have begun. And we have begun in the best American tradition - with a program of joint Federal, state and local action..."

That Congress was in a mood for bolder legislation is evidenced by subsequent congressional actions. Outstanding among these actions was passage late in 1966 of the Clean Waters Restoration Act. This further amendment to the basic Federal water pollution control law expanded and strengthened the Federal role and increased the assistance, especially financial, made available. Intergovernmental relations in this field are still undergoing evolution, and the ultimate role of the national government will be determined by the kind of job the municipalities, the States, and industries are able and willing to do.

Nowhere in the Nation is the tidal wave of reaction - the mounting alarm over pollution - more evident than in the Great Lakes

Area. Governors of the Lake States have given strong support to water pollution control - convening top-level conferences, promoting State programs of financial aid to cities as a supplement to Federal construction grants, and establishing standards for enhancing water quality.

Once buried on the back pages of newspapers, water pollution is now front-page news. Civic groups, labor unions, and crusading private citizens have added their voices to those of public health and conservation spokesmen.

The present generation holds the Lakes in trust, with an obligation to posterity to pass along this magnificent resource in the best possible condition.

The water pollution problems of the Great Lakes are myriad and complex. But the will to do something about it is strong. Ways will be found.

IMPORTANCE OF THE GREAT LAKES

The Great Lakes Area (see map in the middle of this booklet) is characterized by large concentrations of people, industry and fresh water. In 1960 more than 25 million people lived within its boundaries; more than 20 million or 80 percent of the total live in metropolitan areas. In 1963 manufacturing activity exceeded 40 billion dollars - almost one-fourth of the Nation's total. For many decades much of the area has been referred to as the industrial belt of the Nation. The area has the largest, most dependable, and most valuable fresh water resources in the United States. It is imperative that they not be lost or degraded. Not only is a large part of the existing population and industry of our country dependent upon them, they also are vital to future growth. Within less than fifty years the population of the Great Lakes Area is expected to double, or exceed 50 million people; industrial activity during the same period may well increase four or even fivefold.

Industrial water use in 1960 in the Great Lakes Area was estimated to be 2,660 billion gallons. The quantity may triple within 50 years. These industries employed almost a half million persons. Municipal water use in the same year was approximately 1,400 billions of gallons. It may reach 3,000 billion by the year 2010. Municipal water facilities drawing water from the Lakes or connecting waters serve almost 15 million persons.

World's largest municipal water treatment plant - Chicago.

To state the value of the water resources to industry and for municipal consumption only partially tells the story. The importance of the Lakes and their tributaries for recreation and for commercial fishing, although difficult to measure in dollar terms, is clearly enormous. During the summer months of 1960 in the Lake Michigan Basin alone there were more than 50 million "activity days" of water-oriented recreation. If suitable facilities exist, the number may be five times as large by the year 2010. With regard to commercial fishing the United States catch in 1964 totalled over 53 million pounds - half of which was taken from Lake Michigan.

The enhancement of recreational opportunities, the improvement or maintenance of water quality for municipal and industrial use, and the over-all betterment of the esthetic aspects of lake shores and tributaries will result not only in dollar savings but also in greater personal enjoyment to millions of people. To a great extent the future growth of the area is dependent upon the adequacy of a suitable quantity and quality of its water resources.

Little Waters of
Big Lakes Country.

WATER POLLUTION PROBLEMS

Physical Problems

When the Great Lakes were formed by receding glaciers some 20,000 years ago, their waters were excellent in quality. Although the overall quality remains generally good, particularly when compared to some of our severely polluted streams, it has undergone continuous deterioration as a result of waste inputs from natural runoff and the activities of man. The widely publicized water quality problems of Lake Erie dramatically emphasize the consequences of this deterioration.

The major physical problems of the Great Lakes Area are:

--- Biological imbalance.
--- Buildup of dissolved solids.
--- Bacterial contamination.
--- Chemical contamination.
--- Oxygen depletion.

Discussion of each of these significant water quality problems follows:

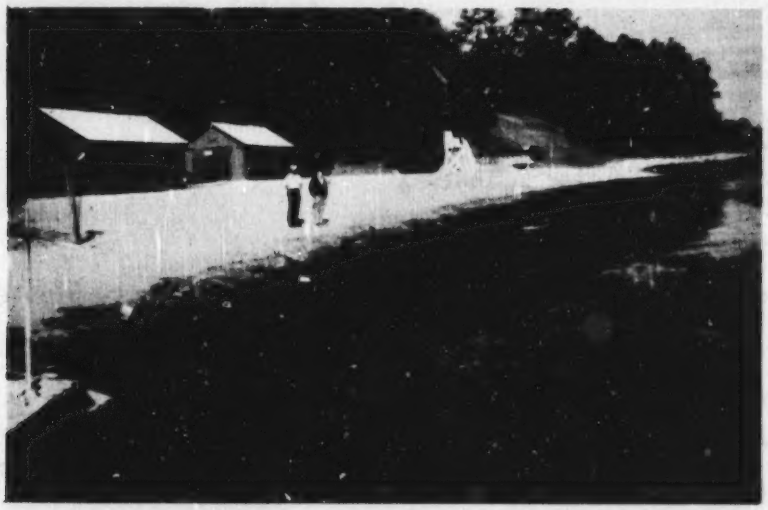
Biological Imbalance

Every lake, including our own Great Lakes, undergoes an aging process which is inevitable and leads - in time measured on a geologic scale - to its destruction. Of immediate concern, however, is not the lake's inexorable fate but the rate of its evolution. Aging is rapidly accelerated by inputs of nutritive materials, nitrogen and phosphorus, that enrich the aquatic environment. Fertilizers carried into a lake by land runoff, along with the nitrogen and phosphorus contained in municipal and industrial waste discharges, hasten the aging or eutrophication process.

At some stage in the life history of the lake, nutrient concentrations reach a level where the addition of more nutrients produces "blooms" of algae and the water becomes murky. Initially, the blooms are not dense but blooms of greater density follow, and the algal population and species change to the blue-green types that cause noxious odors and appear as unsightly scums on the water surface.

Concurrent with the development of algal blooms, other significant changes occur. Dissolved oxygen levels become depressed in the bottom of thermally stratified lakes. (See subsequent discussion of oxygen depletion.) Bottom-dwelling fauna change from clean water forms

to pollution-tolerant forms. Drastic changes take place in the fisheries with the highly-prized game fish, such as pike, trout and whitefish becoming scarce as the coarse, less valuable fish such as carp, catfish, and sheepshead become dominant. In shallow waters near shore, attached filamentous forms of algae grow abundantly, forming long strings which break loose and wash up onto the shore. Unsightly odorous messes result, interfering with the recreational use of waters and beaches, clogging water intakes, and depressing property values.



Dead algae foul beaches and swimming waters.

Sad as it may seem, we have in effect just described the principal water quality problems in the smallest of our Great Lakes, Lake Erie. A Federal enforcement conference in August, 1965 disclosed that 174,000 pounds of soluble phosphate are being discharged to Lake Erie each day. Algal concentrations have reached such proportions that extensive blooms have been observed. A bloom occurred in 1964 which affected 2,600 square miles of the central basin. Oxygen levels in the 2,600 square mile area, near the water bottom, were as low as zero to 2 milligrams per liter (mg/l). Algae in other areas of the Lake foul beaches and waterfront property, often result in filter clogging in water treatment plants, and produce taste and odors in drinking water under some conditions.

Evaluation of biological conditions in Lake Ontario shows that this Lake is on the verge of becoming eutrophic (waters with a good supply of nutrients, capable of supporting rich organic productions). The ability of the Lake to support algal blooms and great masses of attached filamentous forms of algae along the shoreline is a definite indication of eutrophication. Apparently the major reason Lake Ontario has not already become eutrophic is its deep waters.

In Lake Michigan enrichment of the waters has not reached the stages of Lakes Erie or Ontario. However, in isolated locations such as the southern part of Green Bay near the mouth of the Fox River, the Milwaukee Area and the Calumet Area, biological findings have indicated the presence of waters subject to organic enrichment. Much filamentous algae has been found at nearly every beach in the southwestern corner of the Lake. Clogging of water intake screens has cause serious trouble at Chicago's South District Filtration Plant.

Many smaller lakes in the Great Lakes Area have reached a state of deterioration even more advanced than Lake Erie's. Notable among these are some of the famed Finger Lakes, in upstate New York.

Another dramatic example of an upset in the balance of nature is the invasion of the Great Lakes by the alewife. These little fish, descendants of a species which has migrated into the Lakes from the ocean and adapted itself to the fresh-water environment, have become pests mindful of the great locust plagues recorded in history in some land areas of the world. The alewife is a useless fish. They are not good to eat, and there is no sport to catching them. Efforts to find a commercial market for them, as animal food, have been only partially successful. By competing for food supply, they crowd out more desirable species. Worst of all, they move in enormous schools from the deeper recesses of the lakes, especially Lake Michigan, into inshore waters and die there by the millions - clogging water intakes and piling up in stinking masses on shores.

The massive influx and die-off of alewives has become an annual event each spring in Lake Michigan and, to a lesser extent, the downstream Great Lakes. It reached record proportions in Lake Michigan last spring and early summer, when deaths estimated in the billions occurred. On that occasion our agency conducted a special water sampling survey to determine the quality of the water and whether water pollution could have played a part in the die-off. All evidence collected indicates that water pollution did not contribute to the deaths.

The Interior Department's Bureau of Commercial Fisheries is spearheading the search for further answers to the alewife problem, including ways to bring the alewife population into balance with other aquatic life.

Buildup of Dissolved Solids

Waste inputs to the Lakes have also resulted in a buildup in average concentrations of dissolved constituents such as chlorides, sulfates, and the hardness-producing salts. The rate of buildup is increasing in Lake Michigan, for example, where the chloride concentration has doubled since 1910, increasing from 4 to 8 mg/l. Sulfates are increasing at a slightly greater rate, averaging about 1 mg/l in 7 years. The present sulfate level in Lake Michigan is 20 mg/l.

Although these concentrations are well below levels that would seriously impair water uses, they are heavily influenced by population and industrial growth. Localized problems are being experienced in the vicinity of heavy waste input points. These problems emphasize the need to prevent indiscriminate dumping of unwanted materials into the Lakes.

Bacterial Contamination

Another indication of deteriorated water quality, and one which can be traced more directly to man, is the presence of coliform bacteria. Coliform organisms are significant because they occur in the fecal matter of all warm-blooded animals, including man. Consequently, the presence of these bacteria in a body of water is interpreted as evidence of fecal contamination. Since contamination of water by fecal matter is one avenue of transmission of certain waterborne diseases, the presence of coliforms is an indication of a potential health hazard.

Studies have shown that the bacterial quality of Lake Michigan is generally good in deep water but is degraded along the shoreline and in harbor areas. High bacterial densities show a close correlation with heavily populated areas. Evidence of severe bacterial contamination of tributaries to Lake Michigan has been found in the Fox River between Lake Winnebago and Green Bay, Wisconsin; the Milwaukee River within Milwaukee County, Wisconsin; and the streams of the Calumet Area Illinois and Indiana.

Tributaries of Lakes Erie and Ontario introduce fairly high quantities of polluted water, but the main bodies of the Lakes are not considered to be bacterially contaminated. As the tributaries enter the Lakes, their waters mix and dissipate the pollutional load with the Lakes and, except for harbor-inshore areas in close proximity to or downflow of tributaries, the quality remains good. The Niagara River, the connecting link between Lakes Erie and Ontario, is severely polluted in terms of bacterial contamination.

Generally the severe problems of bacterial contamination in the Great Lakes Area are located around the population centers. But,

of course, this is precisely where the great demands for water usage occur. Many Great Lakes beaches are currently closed because of health hazards.

The large number of vessels, commercial ships and recreational boats, now plying the waters of the Great Lakes and their tributaries also represent significant sources of both untreated and inadequately treated wastes capable of causing local problems of bacterial pollution.

To close or not to close the beach?
This is the way one Great Lakes
city approaches the question.

Chemical Contamination

Discharges from industrial plants and commercial ships, and careless practices in loading and unloading of cargoes, cause chemical contamination of water in many areas. Such contamination takes the form of oil and tarry substances, phenolic compounds or other persistent organic chemicals contributing to taste and odor problems, ammonia and other nitrogenous materials, phosphorus, suspended matter, and highly acidic or alkaline materials.

The principal areas exhibiting pollution of this nature are as follows:

Duluth-Superior Area, Minnesota and Wisconsin
Southern Green Bay, Wisconsin

Milwaukee Area, Wisconsin
Calumet Area, Illinois and Indiana
Saginaw River and Bay, Michigan
Detroit Area, Michigan
Maumee River, Indiana and Ohio
Lower Cuyahoga River, Ohio
Niagara Area, New York
Rochester Area, New York
Syracuse Area, New York

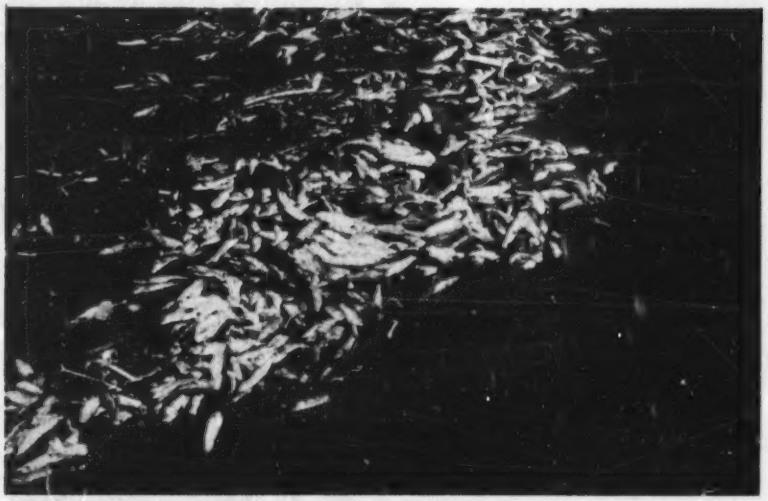
Chemical wastes produce unsightly conditions, contribute to taste and odor problems and treatment problems at water treatment plants, and in some cases are toxic to desirable fish and aquatic life. The detrimental effects of these chemicals on man have not been fully evaluated.

Paper mill wastes - one of the largest causes of pollution.

Oxygen Depletion

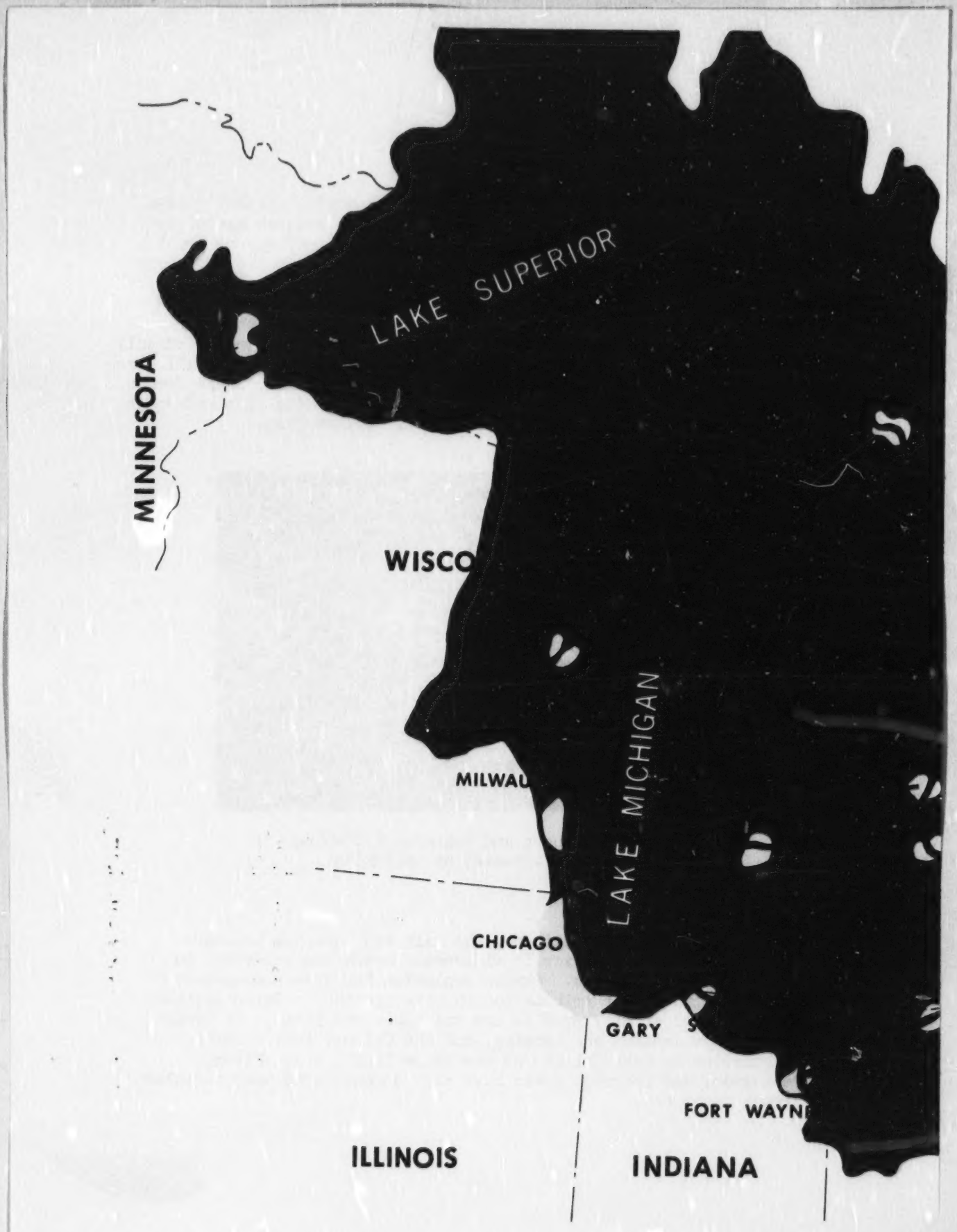
The small quantity of oxygen normally dissolved in water is perhaps the most important single ingredient necessary for a healthy, balanced, aquatic environment. Dissolved oxygen is consumed by living organisms through respiration and is replenished, if a well-balanced environment exists, by absorption from the atmosphere and through the life processes, of aquatic plants. When organic pollution enters this

environment, the balance is altered. The bacteria, present in the water or introduced with pollution, utilize the organic matter as food and multiply rapidly. The resulting deficiency may be great enough to inhibit or destroy the fish and other desirable organisms and to convert the stream or lake into an odor-producing nuisance. Solubility of oxygen in water is quite low, saturation values ranging from 8 to 13 milligrams per liter (mg/l) depending on water temperature and, in lesser degree, on atmospheric pressure. Commonly accepted minimum concentrations that should be maintained at all times to prevent nuisance and promote desirable aquatic life, range from a minimum of 3 mg/l, which will support minimal aquatic life and rough fish, to 6 or more mg/l for certain types of game fish.



Both sport and commercial fishing
are affected by pollution.

As previously mentioned, the main body of Lake Erie has exhibited oxygen depletion in widespread areas due primarily to widespread algal blooms. Oxygen depletion has also been observed in some of the major tributaries to Lake Michigan. Prime examples of this water quality problem are the Lower Fox River, the Grand River below Jackson and Lansing, and the Calumet Area streams. Tributaries to Lake Ontario at the Barge Canal, Black River, Rochester, and Lockport Areas have also demonstrated poor dissolved oxygen resources.


LAKE SUPERIOR
MINNESOTA
WISCO
MILWAU
LAKE MICHIGAN
CHICAGO
GARY
FORT WAYN
ILLINOIS
INDIANA

THE GREAT LAKES AREA

GREAT LAKES AND MAJOR RIVERS

CENTER OF POPULATION AND INDUSTRY

In general the discharge of treated and untreated municipal and industrial wastes in these areas produces these polluted conditions. The high concentrations of biochemical oxygen demand (BOD) in the waste discharges combine, in some cases, with severe drought flows of receiving waters to intensify the problems of this nature.

Management Problems

Although the physical problems discussed above are very complex, their solution depends in turn upon the solution of extremely complex economic and political problems. One of the primary problems is the diversity of, and need for coordination between, the large number of organizations at all levels of government which have an interest in and authority for various phases of water pollution control. Two nations, Canada and the United States, a number of international and interstate organizations, eight States and two Provinces, and many local communities are actively involved in the control of water pollution in the Great Lakes.

GPO 805-927-4

WHAT IS BEING DONE

Federal Activities

The Federal Water Pollution Control Administration through the Great Lakes Regional Office is pursuing a vigorous water pollution control program in the Great Lakes Area in cooperation with the State and local agencies. The following is a summary of the actions being taken under existing authority to enhance the quality and value of the waters of the Great Lakes Basin. Included is a brief description of a nationwide program which is a background for the actions taken in the Great Lakes Basin.

National Program

Increasing interest and concern over the widespread problems related to water pollution are reflected in Federal legislation, particularly during the past 10 years. The Water Quality Act of 1965 and the Clean Waters Restoration Act of 1966 are the most recent and significant legislative milestones. These Acts amend the Federal Water Pollution Control Act of 1956, which was previously amended in 1961.

The basic Act, as amended in 1961, authorized certain water pollution control activities, including the development of comprehensive water pollution control programs, research, technical assistance, training, grants for State programs and the construction of sewage treatment facilities, enforcement, and pollution control from Federal installations. A Federal program of this stature required substantial resources in personnel, facilities, and funds. The years 1961 through 1965 were a period of widely expanding effort in the war on water pollution. Ten of the Nation's major basins, including the Great Lakes, were under study for the development of comprehensive programs. The construction grants program, from its beginning in 1956 to the middle of 1967, granted over $800 million in Federal funds to help finance some 7,319 municipal sewage treatment projects. Equally important, 42 Federal-State enforcement conferences have brought recommended measures and schedules for pollution abatement.

The two recent amendments, previously mentioned, established a new Federal Water Pollution Control Administration, removed the dollar ceilings on sewage treatment construction grants, provided for increased Federal participation if States enacted grant programs and adopted water quality standards, and authorized an additional 10 percent for any such grant conforming with metropolitan or regional master development plans. These amendments require the development of water quality standards for interstate waters and also authorizes increased grants for research and for research and demonstration projects. The new provisions of the Act were designed to strengthen.

and expand the collective effort in attaining adequate pollution control throughout the country.

Research

The 1961 amendments to the Federal Water Pollution Control Act, provided a research program to develop and demonstrate practicable means of treating sewage and other waterborne wastes to restore the Nation's waters to quality suitable for reuse. This program was vastly expanded to include a Research and Demonstration Grants program by the 1965 and 1966 amendments, which authorized a total of $325 million for these purposes. Encouraging progress has resulted and initial research has indicated that advanced waste treatment can be made both technologically and economically feasible. The most promising processes developed to date are: 1) foam separation, 2) coagulation - solids removal, 3) granular carbon adsorption, and 4) electrodialysis. Much research and development work remains to be done, however, before the goal of accomplishing any degree of waste treatment required, at any location, under any condition, and at a minimum cost is reached.

The 1961 amendments also authorized the establishment of water pollution laboratories throughout the nation. The National Water Quality Laboratory at Duluth is the first such laboratory in the Great Lakes Area. A second laboratory has been authorized for the Great Lakes Area at Ann Arbor, Michigan.

Secretary Udall dedicates water quality laboratory at Duluth.

Recent investigations of phosphate removal efficiencies in conventional municipal sewage treatment plants have also proved rewarding. It appears that relatively minor modifications in plant operation can result in much higher phosphate removal efficiencies. The value of such research findings could prove quite significant, particularly in the Great Lakes where many of our large communities discharge large phosphate loadings to the Lakes and algal problems have resulted.

Water Quality Standards

The Water Quality Act amendments of 1965, as previously mentioned, required the establishing of water quality standards for all interstate streams. In compliance with the deadline of June 30, 1967 set by the law, all States submitted water quality criteria and a plan of implementation for the interstate waters and portions thereof for their respective jurisdictions. These submissions are now under review by the Secretary of the Interior and will become the Federal standards on the interstate streams upon approval by the Secretary. In the Great Lakes Basin, as of August 1967, submissions by the States of Indiana and New York have been approved. Establishment of these standards will mark a significant step toward improving the water quality in the Great Lakes. Enforcement of these standards is the primary responsibility of the respective States. Federal enforcement action is called for only if enforcement action by the State does not secure abatement of pollution.

Federal Installations

The Federal Government has not overlooked the pollution hazards created by its own activities. By Executive Order 11288, President Johnson has directed the heads of the departments, agencies, and establishments of the Executive Branch of the Government to provide leadership in the nation-wide effort to improve water quality.

All agencies have been directed to present a phased and orderly plan for needed corrective and preventive measures and facilities to the Bureau of the Budget to facilitate budgeting. In addition, all Federal installations are required to provide at least secondary waste treatment. Federal installations such as Air Force bases, NIKE Sites, Army ammunition plants and depots, Job Corps Centers, National Forest recreation facilities, and Coast Guard stations in the Great Lakes Area have initiated pollution abatement programs in furtherance of the Order. General improvement in housekeeping and surveillance as well as the upgrading of existing waste treatment facilities have resulted from each agency's desire to provide the leadership necessary to effect the Nation's goal of clean water.

Federal water resources projects and facilities and operations supported by Federal loans, grants, or contracts are also included in Executive Order 11288. Water resource projects must be designed, constructed, and operated in a manner which will reduce pollution from such activities to the lowest practicable level. The head of each Federal department, agency, and establishment has been directed to conduct a review of the loan, grant, and contract practices of his own organization to determine to what extent water pollution control requirements set forth in the Order should be adhered to by borrowers, grantees, or contractors. This review has resulted in practices designed to reduce water pollution in various programs. Urban renewal projects now require the construction of separate storm and sanitary systems rather than combined systems. The nation-wide highway construction program, financed with Federal funds and administered by the Bureau of Public Roads, is now being conducted in accordance with practices aimed at preventing water pollution through their design, construction, and maintenance. The various agencies have consulted with the Federal Water Pollution Control Administration in an effort to insure maximum consideration of water quality in their activities.

The disposal of dredgings from harbor and channel areas which contain polluted material contributes to the pollution of the Great Lakes. In an effort to reduce this pollution the Corps of Engineers of the Department of the Army and the Federal Water Pollution Control Administration are cooperating in an effort to develop alternate means of disposal at the earliest practical date. Agreement for attacking this problem was entered into by the two agencies in the form of a joint public statement released on March 1, 1967. The exclusion of polluted dredged material from the Great Lakes will aid in the overall water quality enhancement.

This Order represents a major step forward in the battle to preserve and enhance the quality of our Nation's waters. It has sparked a keen awareness on the part of government officials of the need for corrective action and vigorous pollution abatement programs. The effort being shown by these various Federal agencies provides leadership in the nation-wide quality improvement program.

Enforcement Action-Great Lakes Area

Under the provisions of the Federal Water Pollution Control Act, the Secretary of the Interior is authorized to call an enforcement conference when requested to do so by the Governor of a State, and when, on the basis of reports, surveys, or studies, he has reason to believe that pollution of interstate waters subject to abatement under the Act is occurring.

The purpose of the conference is to bring together the State water pollution control agencies, the representatives of the Department of the Interior, and other interested parties to review the existing situations, the progress which has been made, to lay a basis for future action by all parties concerned, and to give the States, localities, and industries an opportunity to take any indicated remedial action under State and local laws.

There have been four such Federal-State enforcement actions in the Great Lakes Area.

Conference Area	States Involved	Date
Detroit River-Western Lake Erie	Michigan	March 27, 1962 (Reconvened on June 15, 1965)
Menominee River	Michigan and Wisconsin	November 7, 1963
Calumet Rivers and Lake Michigan	Indiana and Illinois	March 2, 1965 (Technical Session January 4, 1966) (Conferees Meeting March 22, 1967) (Conferees Meeting September 11, 1967)
Lake Erie and its Tributaries	Pennsylvania, New York, Michigan, Indiana, and Ohio	August 3, 1965 (Cleveland) August 10, 1965 (Buffalo) (Conferees Meeting June 12, 1966) (Conferees Meeting March 15, 1967)

The conclusions and recommendations reached by the conferees cover subjects peculiar to the problems of each conference area. In the Menominee Conference pulp and paper wastes were the greatest contributors to pollution. In Lake Erie the prime concern was overfertilization that causes excessive algae growths. In the Calumet River-Lake Michigan area the prime concern is industrial pollution.

Because of these differences, clean-up agreements and policies have been reached covering several aspects of pollution control. These clean-up agreements vary from one conference area to another. The required control measures range from "construction and operation of sewage treatment plants for maximum phosphate removal" to "prevention of garbage dumping along streams and lake shorelines."

Periodic progress meetings are held when appropriate in connection with the various enforcement actions to assess progress in compliance with the agreed upon schedules.

Comprehensive Program-Great Lakes Area

The Great Lakes-Illinois River Basins Project was formed for the purpose of developing comprehensive water pollution control programs for the Great Lakes and Illinois River Basins. The major objectives of the comprehensive program are:

- Identification of the causes of water pollution and the effects of such pollution on the quality of water resources and on beneficial uses.

- The development of agreements on the desired beneficial uses and the water quality required to accommodate those uses.

- The development of water quality control measures to achieve the desired objectives, including the establishment of a timetable for their accomplishment.

- Provision of the mechanisms for carrying out program objectives, including continuing surveillance for the purpose of updating the programs to accommodate changing technology and changing water quality needs.

State Activities

All Federal water pollution control legislation has recognized that the primary responsibility for the control of pollution resides in the States. The rising public concern over water pollution which has resulted in stronger laws at the Federal level has also had a significant impact on State water pollution control legislation. Federal grant assistance is provided to all State water pollution control agencies. This assistance comprises 30 to 60 percent of the States' water pollution control budget.

The eight States that border the Great Lakes are among the richest and most progressive in the Nation and their approach to the problems of water resource management is broad. The tools available to the State governments in their anti-pollution efforts range from the power to prohibit waste discharges to the use of tax incentives to encourage the construction of needed facilities.

An example of recent water resource legislation is the new Wisconsin law which went into effect August 1, 1966. The law provides for financial aid to local communities, the establishment of water quality criteria for the waters of the State, and for comprehensive planning by regions within the State. In addition, the staff and funds of the water resource agency were greatly increased. In the State of New York a bond issue totaling approximately one billion dollars for the construction of sewage treatment facilities was passed last year. In Illinois a one billion dollar bond issue is scheduled to be placed before the voters in 1968. Other States in the Great Lakes Area have also shown significant increases in the amount of funds allocated to State water pollution control programs. The Governors of several Great Lakes States have shown their interest in the pollution problem in their respective States by calling conferences to emphasize the seriousness of the problems.

The above factors indicate that the States are becoming increasingly aware of their central role in water pollution control, and that they must do much more in the future than has been done in the past.

Regional and Local Activities

In recent years there has been an increase in the number of regional planning agencies concerned with the water pollution problems of metropolitan areas. However, such regional agencies do not at the present time have sufficient funds, manpower or authority to adequately implement the master plans needed for our complex urban areas. Recognizing this, the 1966 amendment to the Federal Water Pollution Control Act provided for grants to local water pollution control planning agencies.

Local pollution control activities often receive less recognition than the actions taken at the Federal and State levels. It is essential to realize, however, that remedial action to correct many of our major water pollution problems must ultimately be taken at the local level. There are many signs that our municipalities are becoming increasingly aware of their pollution problems and are taking appropriate steps to eliminate them.

Industrial Activities

Industries in the Great Lakes Area are demonstrating their concern over the problems of water pollution. Many leaders of industry have come to the realization that the cost of pollution control is a necessary and legitimate cost of production. Planning for pollution abatement is an integral part of the construction of new plants, and methods to reduce the pollutional load from older plants are receiving much attention.

Interstate and International Cooperation

Several organizations have been established to attempt to deal with the complex interstate and international problems of water resources management in the Great Lakes Area.

In order to establish effective organizations to plan basin-wide water resource management programs, Congress passed significant legislation in 1965. The Water Resources Planning Act provides for the creation of river basin commissions. Each commission would serve as the principal agency for the coordination of Federal, State, interstate, local and non-governmental plans for the development of water and related land resources in its area. The Great Lakes Basin Commission was established under this authority to provide for such a coordinated effort in the Great Lakes Basin.

The Great Lakes Commission, although not recognized as an interstate compact, is composed of the States of Wisconsin, Michigan, Minnesota, Indiana, Pennsylvania, Illinois and New York. It was formed to conserve and develop the water resources of the Great Lakes Area.

The Great Lakes Study Group is composed of representatives of several Canadian and U. S. government agencies, formed on an informal basis to exchange technical information concerning studies of the Great Lakes.

The Great Lakes Fisheries Commission was established by the United States and Canada in accordance with the terms of the Convention on Great Lakes Fisheries ratified in 1955. Its major functions are to formulate and carry out research programs to protect the fisheries of the Great Lakes Area.

The Boundary Waters Treaty between the United States and Canada, signed in 1909, established the International Joint Commission. The Commission appointed two Advisory Boards on Control of Pollution of Boundary Waters, composed of Federal and State engineers

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from the two Nations, to examine and evaluate pollution problems and to interpret progress of abatement programs. Since 1952, field units have been maintained by the United States in Detroit and Buffalo to collect basic water quality data, study transboundary travel of pollution, determine improvements resulting from municipal and industrial waste treatment, assemble data on water uses, and apply new analytical techniques in boundary water pollution control investigations. In October, 1964, the Commission was requested by Canada and the United States to report upon pollution in the waters of Lake Erie, Lake Ontario and the International Section of the St. Lawrence River. An Interim Report on the subject was prepared by the Commission in December, 1965. Recommendations were made for the maximum possible removal of phosphates from all municipal and industrial waste discharges, the prohibition of the construction of combined sewer systems, and the separation of existing systems, and an effective system of sampling effluents of waste sources. A program of investigation and research was also recommended.

The Diversion Case

A significant step toward preservation of Lake Michigan and the entire Great Lakes was realized when the Lake States agreed to the recommendations of the Special Master of the Supreme Court in the Chicago Diversion Case. The Special Master's report recognized the need to protect the waters of both Lake Michigan and the Illinois River. The Special Master's recommendations are summarized as follows:

1. That the Metropolitan Sanitary District of Greater Chicago not be required to return its treated effluent to Lake Michigan.

2. That total diversion including pumpage be limited to the present 3,200 cubic feet per second and that diversion be averaged on a biennial rather than an annual basis.

3. That the State of Illinois be given the responsibility for allocating the diversion.

4. That the most wise and effective use of the water be demonstrated before consideration is given in the future to requests for diversion. This will require improvements in the water supply distribution and waste collection and treatment practices.

The first of the above recommendations was the most significant for the protection of the water quality of Lake Michigan.

Waste from Watercraft

A report of pollution of the navigable waters by wastes from watercraft was submitted to Congress on June 30, 1967. This report recognizes the serious problems that are caused by all types of watercraft, including the problem of oil pollution. Implementation of the recommendations in this report by Congress will provide an effective means for dealing with this problem on the Great Lakes. The City of Chicago has already taken the lead in strengthening its requirements for controlling pollution from watercraft.

Control of Oil Pollution

The increasing occurrence of oil pollution in inland waters was recognized by Congress in the 1966 amendments to the Oil Pollution Act of 1924. These amendments extended the provisions of the Act to cover inland as well as coastal waters, and made the Federal Water Pollution Control Administration responsible for enforcement.

Today there are two Federal laws covering oil pollution in navigable waters: the above-cited Oil Pollution Act, as amended; and the Rivers and Harbors Act of 1899, commonly known as the Refuse Act. The first covers oil discharged from vessels and the second, oil from harbor or land sources which reaches navigable waters. Three Federal agencies are now carrying out an expanded program for oil pollution control. These are the FWPCA for the Oil Pollution Act, the U. S. Army Corps of Engineers for the Refuse Act, and the U. S. Coast Guard. The Coast Guard, with its surface and air reconnaissance capability, serves as the fact-finding and intelligence arm for the enforcement agencies. A report, to any one of these agencies, of incidents of oil pollution will swiftly bring coordinated action -- to stop the discharge if it is continuing, to contain the spread of discharged oil where feasible, to apprehend and prosecute violators, and see that steps are taken to prevent a recurrence. Close communication is maintained with State water pollution control authorities and with conservation groups, both governmental and private.

ACTION NEEDED

1. All municipal waste treatment facilities should be designed to provide at least secondary (biological) waste treatment. Such facilities should be efficiently and continuously operated to achieve an overall 90 percent, or higher, removal of the untreated waste load, as measured in terms of oxygen-consuming wastes.

2. Continuous disinfection should be provided throughout the year for all municipal waste treatment plant effluents.

3. All separately discharging industrial wastes should receive the equivalent of at least secondary treatment, as described above. Action should also be taken toward the exclusion or treatment of industrial wastes causing chemical pollution. Where practicable, industrial wastes should be discharged to municipal sewerage systems.

4. Organic wastes and sanitary sewage discharged by industries should receive treatment comparable to that recommended for municipal wastes.

5. Maximization of phosphate removal, through modification in the operation and/or design of existing and newly constructed secondary waste treatment facilities should be an immediate objective. Records of phosphorus removal at treatment plants should be carefully evaluated after one year to determine if significant phosphorus removals have been achieved. If such removals are not achieved, consideration should be given to the installation of chemical precipitation facilities at such plants.

6. Combined sewers should be prohibited in all newly developed urban areas and should be separated in coordination with urban renewal projects. Existing combined sewer systems should be patrolled and overflow regulating devices should be adjusted to convey the maximum practicable amount of combined flow to treatment facilities.

7. Agricultural practices should be reviewed to ensure the maximum protection of the waters of the Great Lakes from the improper application of fertilizers and pesticides. The use of pesticides and herbicides should be more closely scrutinized. At a minimum, accurate estimates of quantities utilized on a county basis should be developed. This will aid in pinpointing potential problem areas.

8. Where practicable, waste heat discharges, particularly from steam power plants, should be reduced where other water uses are adversely affected. In the planning of new installations requiring large amounts of cooling water, the quality requirements of the receiving bodies of water should be a prime factor in determining the location of such installations and the need for cooling towers to dissipate heat.

9. Master plans for future waste collection and treatment facilities should be developed for the rapidly urbanizing metropolitan areas as quickly as possible. Such plans should provide, among other things, for maximum use of integrated facilities which will permit eventual elimination of the conglomeration of small, inefficient facilities surrounded by residential and commercial development. Master plans should encompass whole metropolitan areas and should not be restricted by political boundaries.

10. Forceful action is needed now at all levels of government to control and prevent pollution by the wastes from watercraft. Details of these needs are spelled out in the report, Wastes from Watercraft, submitted to the Congress by the Department of the Interior, Federal Water Pollution Control Administration, and published as Senate Document No. 48, 90th Congress, 1st Session. Especially pressing is the need for strengthening of laws and regulations--Federal, State, and local--governing waste handling and disposal from vessels. The mobility and ubiquity of watercraft make it necessary that laws of the several Great Lakes States be mutually consistent--though not necessarily identical, for more stringent restrictions would apply to some waters than to others.

11. The offshore disposal of dredgings from harbor and channel areas which contain residues from the sewage of cities and industries is a poor practice, if the quality of the Great Lakes is to be maintained. It is recommended that those involved in such practices provide other means of disposal which will not adversely affect the water quality of the Lakes.

12. Monthly reports covering the operation of all municipal and industrial waste treatment plants, including the quality and quantity of discharged effluent, should be submitted to the appropriate State agencies for review, evaluation and appropriate action.

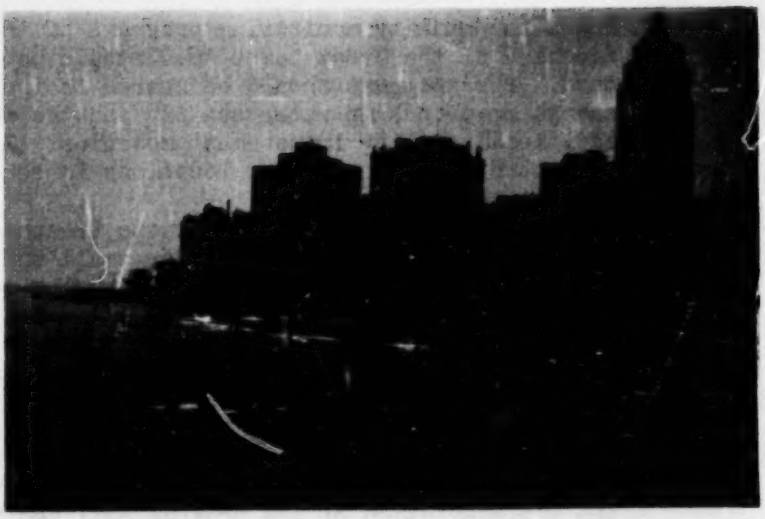
13. The operation of all streamflow regulation facilities should be reviewed to ensure the availability of the maximum practicable streamflow at all times.

14. The water quality monitoring programs of the State agencies of the Great Lakes Area should be strengthened. The programs should be geared to indicate change or trends in water quality and the need for additional quality improvement measures. The use of automated equipment in key locations is recommended.

15. State agencies should conduct waste treatment plant inspections at least annually for small and medium-sized plants, and at least twice annually for the larger plants.

16. It is recommended that the water pollution control activities in each of the Great Lakes States be strengthened in terms of staffing and budget. With additional resources and the support available from the Federal Water Pollution Control Administration, the implementation of the program outlined herein can be accelerated to meet the growing need for clean water.

It's 30-mile lakefront is today the pride of Chicago, because 70 years ago the pollution was shifted to other waters...



...the other waters are still polluted.

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